

Application Serial No.: 10/811,863  
Art Unit: 2853

### ***REMARKS***

This is a full and timely response to the outstanding non-final Office Action mailed July 11, 2006. Claims 1-18 remain pending in the present application. Reconsideration and allowance of the application and pending claims are respectfully requested.

**1. Response to Rejections of Claims under 35 U.S.C. § 112, Second Paragraph**

Claims 3 and 12-14 have been rejected under 35 U.S.C. § 112, Second Paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim subject matter. Claims 13 and 14 have been amended to overcome the rejections. Therefore, Applicants respectfully request withdrawal of the rejections.

**2. Response to Rejections of Claims under 35 U.S.C. § 103**

In the Office Action, claims 1, 5, 6, 8, and 10 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over *Teng* (U.S. Patent No. 6,242,156) in view of *Meyrick* (U.S. Patent No. 6,344,497). Claims 2 and 9 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over *Teng* in view of *Meyrick* in further view of *Arai* (U.S. Patent No. 5,470,691). Claims 3 and 12-14 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over *Teng* in view of *Meyrick* in further view of *Van Damme* (U.S. Patent No. 6,620,573). Claims 4 and 11 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over *Teng* in view of *Meyrick* in further view of *Santo* (U.S. Patent No. 5,965,252). Claims 7 and 15 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over *Teng* in view of *Meyrick* in further view of *Aoki* (U.S. Patent No. 5,743,946). It is well-established at law that, for a proper rejection of a claim under 35 U.S.C. § 103 as being obvious based upon a combination of references, the cited combination of references must disclose, teach, or suggest, either implicitly or explicitly, all elements/features/steps of the claim at issue. See, e.g., *In Re Dow Chemical*, 5 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1988), and *In re Keller*, 208 U.S.P.Q.2d 871, 881 (C.C.P.A. 1981).

**a. Claim 1**

As provided in independent claim 1, Applicants claim:

A microwave curable ink for piezo electric drop-on-demand inkjet printing, comprising:

a. molecules of material in said ink capable of undergoing a polymerization reaction under the influence of microwave radiation;

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b. a microwave radiation absorber in said ink, said absorber enhances absorption of microwave radiation and conversion of said radiation into heat;

c. a thermal initiator in said ink, said initiator being activated by heat generated by said microwave radiation; and

d. a colorant in said ink.

(Emphasis added).

Applicants respectfully submit that independent claim 1 is allowable for at least the reason that *Teng* in view of *Meyrick* does not disclose, teach, or suggest at least "a. molecules of material in said ink capable of undergoing a polymerization reaction under the influence of microwave radiation; b. a microwave radiation absorber in said ink, said absorber enhances absorption of microwave radiation and conversion of said radiation into heat; c. a thermal initiator in said ink, said initiator being activated by heat generated by said microwave radiation; and d. a colorant in said ink," as recited and emphasized above in claim 1.

For example, *Teng* appears to disclose at most a process for preparation of lithographic plates, where the plate has a radiation-sensitive layer. The portions of *Teng* cited in the Office Action are directed to the radiation-sensitive layer of the lithographic printing plate. See Office Action, page 3; and *Teng*, col. 8, lines 1-30. Therefore, *Teng* fails to teach or suggest "a. molecules of material in said ink capable of undergoing a polymerization reaction under the influence of microwave radiation; b. a microwave radiation absorber in said ink, said absorber enhances absorption of microwave radiation and conversion of said radiation into heat; c. a thermal initiator in said ink, said initiator being activated by heat generated by said microwave radiation; and d. a colorant in said ink," as recited in claim 1.

It is further noted that *Teng* does not mention microwaves and does not mention microwave induced polymerization. *Teng* teaches photo-polymerization (not microwave) on specially roughened surfaces (e.g., aluminum).

Further, the cited art of *Meyrick* fails to cure the deficiencies of the *Teng* reference in suggesting or teaching all of the claimed features in claim 1. For example, *Meyrick* discloses water based inks, for which a new functional polymer is used, while dissolved in aqueous solution. *Meyrick* mentions cross-linking of the pre-formed polymers, but not a polymerization reaction in which the polymer is formed after the ink is deposited (printed) and cured. As such, *Meyrick* fails to teach or suggest "molecules of material in said ink capable of undergoing a polymerization reaction under the influence of microwave radiation," as recited in the claim.

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Therefore, a *prima facie* case establishing an obviousness rejection by the proposed combination of *Teng* in view of *Meyrick* has not been made. Accordingly, the rejection of claim 1 should be withdrawn.

b. Claims 2-5 and 13

Because independent claim 1 is allowable over the cited art of record, dependent claims 2-5 and 13 (which depend from independent claim 1) are allowable as a matter of law for at least the reason that dependent claims 2-5 and 13 contain all the features of independent claim 1 and the cited art of *Arai*, *Van Damme*, and *Santo* fails to cure the deficiencies of the *Teng* and *Meyrick* references. As an illustrative example, *Van Damme* describes a method of preparation of printing plate. The ink contains solvent at very high concentration, and also pre-formed polymers and adds transition metal complex, to improve the performance of the plates. In contrast, claimed subject matter in one or more claims does not use solvents and the printed ink polymerization process takes place after printing under microwave radiation. In *Arai*, it describes a process of printing an aqueous ink on CD's, using a (pretreatment) hydrophilic resin onto which the pattern is printed. This does not seem to be relevant to claimed subject matter. For at least these reasons, the rejections of claims 2-5 and 13 should be withdrawn.

Additionally and notwithstanding the foregoing reasons for allowability of claims 2-5 and 13, these claims recite further features and/or combinations of features (as is apparent by examination of the claims themselves) that are patentably distinct from the cited art of record. Hence, there are other reasons why these dependent claims are allowable.

c. Claim 6

As provided in independent claim 6, Applicants claim:

A method of microwave curing of ink for piezo drop-on-demand ink jet printing comprising:

- a. providing an ink, said ink having a microwave absorber and a thermal initiator, said absorber enhancing absorption of microwave radiation;
- b. printing with said ink an image bearing pattern on a substrate; and
- c. irradiating by microwave radiation said printed image bearing pattern such that said image bearing pattern is cured by heat generated by said microwave radiation.

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(Emphasis added).

Applicants respectfully submit that independent claim 6 is allowable for at least the reason that *Teng* in view of *Meyrick* does not disclose, teach, or suggest at least "a. providing an ink, said ink having a microwave absorber and a thermal initiator, said absorber enhancing absorption of microwave radiation" and "c. irradiating by microwave radiation said printed image bearing pattern such that said image bearing pattern is cured by heat generated by said microwave radiation," as recited and emphasized above in claim 6.

For example, *Teng* appears to disclose at most a process for preparation of lithographic plates, where the plate has a radiation-sensitive layer. The portions of *Teng* cited in the Office Action are directed to the radiation-sensitive layer of the lithographic printing plate. See Office Action, page 3; and *Teng*, col. 8, lines 1-30. Therefore, *Teng* fails to teach or suggest "a. providing an ink, said ink having a microwave absorber and a thermal initiator, said absorber enhancing absorption of microwave radiation" and "c. irradiating by microwave radiation said printed image bearing pattern such that said image bearing pattern is cured by heat generated by said microwave radiation," as recited in claim 6.

It is further noted that *Teng* does not mention microwaves and does not mention microwave induced polymerization. *Teng* teaches photo-polymerization (not microwave) on specially roughened surfaces (e.g., aluminum).

Further, the cited art of *Meyrick* fails to cure the deficiencies of the *Teng* reference in suggesting or teaching all of the claimed features in claim 6. Therefore, a *prima facie* case establishing an obviousness rejection by the proposed combination of *Teng* in view of *Meyrick* has not been made. Accordingly, the rejection of claim 6 should be withdrawn.

d. Claims 7 and 15

As provided in independent claim 7, Applicants claim:

A method of printing on an optically reflective substrate by piezo-drop-on-demand ink jet printing comprising:

a. *providing an ink, said ink having a microwave absorber and a thermal initiator, said absorber enhancing absorption of microwave radiation;*

b. printing with said ink an image bearing pattern on said optically reflecting substrate; and

c. *irradiating by microwave radiation said printed image bearing pattern such that said image bearing pattern is cured by heat generated by said microwave radiation and said microwave radiation is not reflected by the substrate.*

(Emphasis added).

Applicants respectfully submit that independent claim 7 is allowable for at least the reason that *Teng* in view of *Meyrick* in further view of *Aoki* does not disclose, teach, or suggest at least "a. providing an ink, said ink having a microwave absorber and a thermal initiator, said absorber enhancing absorption of microwave radiation" and "c. irradiating by microwave radiation said printed image bearing pattern such that said image bearing pattern is cured by heat generated by said microwave radiation and said microwave radiation is not reflected by the substrate," as recited and emphasized above in claim 7.

For example, *Teng* appears to disclose at most a process for preparation of lithographic plates, where the plate has a radiation-sensitive layer. The portions of *Teng* cited in the Office Action are directed to the radiation-sensitive layer of the lithographic printing plate. See Office Action, page 3; and *Teng*, col. 8, lines 1-30. Therefore, *Teng* fails to teach or suggest "a. providing an ink, said ink having a microwave absorber and a thermal initiator, said absorber enhancing absorption of microwave radiation" and "c. irradiating by microwave radiation said printed image bearing pattern such that said image bearing pattern is cured by heat generated by said microwave radiation and said microwave radiation is not reflected by the substrate," as recited in claim 7.

It is further noted that *Teng* does not mention microwaves and does not mention microwave induced polymerization. *Teng* teaches photo-polymerization (not microwave) on specially roughened surfaces (e.g., aluminum). Claimed subject matter recites use of reflecting surfaces and not roughened surfaces. *Teng* further describes use of thermal energy that is actually teaching away from claimed subject matter, since *Teng* discloses thermal ablation, which is removal of the polymeric layer where the claimed subject matter is making every effort to adhere the material to a reflecting surface, as exemplified by the claim language "printing with said ink an image bearing pattern on said optically reflecting substrate."

Further, the cited art of *Meyrick* and *Aoki* fails to cure the deficiencies of the *Teng* reference in suggesting or teaching all of the claimed features in claim 7. For example, *Aoki* teaches a water based ink, containing organic binder and inorganic particles. The inorganic particles are fused at elevated temperature, thus forming a coating which is "safe against fire." *Aoki* mentions microwave in example 11, but only for drying the ink, and not for initiating a polymerization process.

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Therefore, a *prima facie* case establishing an obviousness rejection by the proposed combination of *Teng* in view of *Meyrick* in further view of *Aoki* has not been made. Accordingly, the rejections of claim 7 and claim 15 which depends therefrom should be withdrawn.

e. **Claim 8**

As provided in independent claim 8, Applicants claim:

An ink jet ink composition comprising:

- a. *molecules in said ink capable of undergoing polymerization reaction under microwave radiation;*
- b. at least one colorant in said ink; and
- c. one or more additives in said ink.

(Emphasis added).

Applicants respectfully submit that independent claim 8 is allowable for at least the reason that *Teng* in view of *Meyrick* does not disclose, teach, or suggest at least "a. molecules in said ink capable of undergoing polymerization reaction under microwave radiation," as recited and emphasized above in claim 8.

For example, *Teng* appears to disclose at most a process for preparation of lithographic plates, where the plate has a radiation-sensitive layer. The portions of *Teng* cited in the Office Action are directed to the radiation-sensitive layer of the lithographic printing plate. See Office Action, page 3; and *Teng*, col. 8, lines 1-30. Therefore, *Teng* fails to teach or suggest "a. molecules in said ink capable of undergoing polymerization reaction under microwave radiation," as recited in claim 8.

Further, the cited art of *Meyrick* fails to cure the deficiencies of the *Teng* reference in suggesting or teaching all of the claimed features in claim 8. For example, *Meyrick* discloses water based inks, for which a new functional polymer is used, while dissolved in aqueous solution. *Meyrick* mentions cross-linking of the pre-formed polymers, but not a polymerization reaction in which the polymer is formed after the ink is deposited (printed) and cured. As such, *Meyrick* fails to teach or suggest "molecules in said ink capable of undergoing polymerization reaction under microwave radiation," as recited in the claim.

Therefore, a *prima facie* case establishing an obviousness rejection by the proposed combination of *Teng* in view of *Meyrick* has not been made. Accordingly, the rejection of claim 8 should be withdrawn.

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Art Unit: 2853**f. Claims 9-12 and 14**

Because independent claim 8 is allowable over the cited art of record, dependent claims 9-12 and 14 (which depend from independent claim 8) are allowable as a matter of law for at least the reason that dependent claims 9-12 and 14 contain all features of independent claim 8 and the cited art of *Arai*, *Van Damme*, and *Santo* fails to cure the deficiencies of the *Teng* and *Meyrick* references. As an illustrative example, *Van Damme* describes a method of preparation of printing plate. The ink contains solvent at very high concentration, and also pre-formed polymers and adds transition metal complex, to improve the performance of the plates. In contrast, claimed subject matter in one or more claims does not use solvents and the printed ink polymerization process takes place after printing under microwave radiation. In *Arai*, it describes a process of printing an aqueous ink on CD's, using a (pretreatment) hydrophilic resin onto which the pattern is printed. This does not seem to be relevant to claimed subject matter. For at least these reasons, the rejections of claims 9-12 and 14 should be withdrawn.

Additionally and notwithstanding the foregoing reasons for allowability of claims 9-11 and 14, these claims recite further features and/or combinations of features (as is apparent by examination of the claims themselves) that are patentably distinct from the cited art of record. Hence, there are other reasons why these dependent claims are allowable.

**3. New Claims**

Claims 16-18 have been newly added. Claims 16-18 are dependent from respective independent claims 1, 6, and 8. Accordingly, their patentability follows directly from the patentability of claims 1, 6, and 8. Additionally, these dependent claims recite further features and/or combinations of features (as is apparent by examination of the claim itself) that are patentably distinct from the cited art of record.

For example, claims 16-18 recite "wherein the ink contains only polymerizable components, which are converted into polymeric coating only after printing and by exposure to microwave radiation." The cited art fails to teach or suggest an ink jet ink which undergoes polymerization after printing, such that the ink contains only polymerizable components, which are converted into polymeric coating only after printing and by exposure to microwave radiation.

The favorable reconsideration and allowance of claims 16-18 are respectfully requested.

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***CONCLUSION***

For at least the reasons set forth above, Applicants respectfully submit that all objections and/or rejections have been traversed, rendered moot, and/or accommodated, and that the pending claims are in condition for allowance. Favorable reconsideration and allowance of the present application and all pending claims are hereby courteously requested. If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned agent at (770) 933-9500.

Respectfully submitted,

  
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